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TITLE

Multiplexed Diabetes Management Device

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The Multiplexed Diabetes Management (MDM) device and concept is basically extending the current technology of diabetes care to include other markers of interests. The team is a mixed background of electrical, biomedical and computer science engineering undergraduates, graduates students, and faculty. The basic operation of the proposed device would be similar to current self-monitoring blood glucose devices. The user simply pricks their finger for a small volume of blood, which travels through a capture fluidics system that lyses part of the sample while electrochemically analyzing it for multiple markers currently involved in diabetic care and research. The analysis retrieved on the markers, which exist in inflammatory, metabolic, and immunological pathways will, further aid in daily diabetes care. These markers include: glucose, insulin, HbA1c, 1,5-Anhydroglucitol, and Glycated Albumin. The underlying technological development of MDM, the simultaneous detection of five different markers, comes from a breakthrough development in electrochemical sensing and instrumentation. The transformative detection scheme is a modified electrochemical impedance spectroscopy (EIS) technique developed in the La Belle Lab for tuning markers responses (frequency shift) away from one another. Instead of using a simple DC voltage to induce an enzymatic current flow, this novel technique uses mixed frequency AC signals to perturb enzymes and antibodies specific for these five markers, simultaneously. Once deconvoluted, these signals can show a correlation of the impedance measured to concentrations of the targets in blood.

Biography

Teagan Adamson is completing her B.S.E. degree in Biomedical Engineering with a minor in Chinese from Arizona State University. She is the team leader of the MDM Team in the La Belle Lab. Her portion of the project includes development of the electrochemical impedance spectroscopy based detection of glucose and 1,5-anhydroglucitol. She was a senator for the Ira A. Fulton School of Engineering, and is heavily involved in the Engineering Student Council at ASU. In addition she is a member of Theta Tau, a professional Engineering Fraternity, and is conducting research on her undergraduate thesis for Barrett, the Honors College.

Zach Decke is completing his B.S.E. degree in Biomedical Engineering from Arizona State University. His portion of the project includes development of the electrochemical impedance spectroscopy based detection of insulin. He is a member of Barrett, The Honors College at ASU and is currently conducting research for the completion of his undergraduate thesis.